

### REMARKS

Claims 1-15 are pending in the present Application. Claim 8 has been amended, Claims 11-15 remain withdrawn, no claims have been canceled, and Claim 16 has been added, leaving Claims 1-10 and 16 for consideration upon entry of the present response.

A Request for Continuing Examination under 37 C.F.R. § 1.114, and an Information Disclosure Statement under 37 C.F.R. §§ 1.97 and 1.98 also accompany this response.

Please note that, where the instant Specification is referred to herein, citations are made with reference to the version of the Specification published as U.S. Patent Application Publication No. 2004/0115558 A1.

The Specification on p. 3 in ¶ [0041] and on p. 5 in ¶ [0063], and Claim 8 have each been amended to correct an inadvertent typographical error. Specifically, “6,7-epoxybutyl acrylate” contains an inadvertent typographical error in the numbering of the epoxy substituent, as a butyl group cannot have a 6,7- isomer. The compound has been amended to correctly recite “3,4-epoxybutyl acrylate”. No new matter has been introduced by this amendment.

New Claim 16 has been added to further claim the invention. Support for new Claim 16 can be found in Claims 1, 2, 9, and 10. No new matter has been introduced by this amendment.

Reconsideration and allowance of the claims are respectfully requested in view of the following remarks.

#### Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-10 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,348,298 to Sakurai et al. (“Sakurai”). Applicants respectfully traverse this rejection.

Sakurai teaches a radiation sensitive composition comprising a colorant containing a quinacridone pigment, a mixture of an isoindolinone pigment and a yellow organic pigment, or a mixture of copper phthalocyanine blue and a green pigment, an alkali-soluble resin, a polyfunctional monomer and a photopolymerization initiator.

Sakurai, Abstract. Adhesion promoting agents are disclosed, including 3-methacryloxypropyltrimethoxysilane. Col. 16, lines 1-3, 9, and 21.

For an obviousness rejection to be proper, the Examiner is expected to show that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Instant Claim 1 recites the limitations that the photosensitive resin composition for a color filter comprises "0.1 to 2 wt% of 3-acryloxypropyltrimethoxysilane as a lower layer silane hardener". Applicants respectfully assert that instant independent Claim 1 is patentable over Sakurai because the reference fails to teach or suggest all the limitations of Claim 1, fails to provide a suggestion or incentive that would motivate one skilled in the art to modify the reference to provide the invention as claimed in the instant claims, or that so modifying the reference would fail to provide a reasonable expectation of success for the combination. In particular, Sakurai fails to disclose or teach 3-acryloxypropyltrimethoxysilane, in the claimed amount of 0.1 to 2 wt%; does not teach that any of the adhesion promoters of Sakurai are equivalent to 3-acryloxypropyltrimethoxysilane; and does not provide a suggestion or incentive that would motivate one skilled in the art to use the claimed lower layer hardener 3-acryloxypropyltrimethoxysilane in an amount of 0.1 to 2 wt%, and for these reasons fails to provide a reasonable expectation that Sakurai would as disclosed provide the claimed  $\gamma$  value performance of instant claim 1 as demonstrated by the Examples and Comparative Examples disclosed in the instant Specification for the photosensitive resin composition of Claim 1. Thus, the references do not teach all limitations of the instant claims, does not provide a suggestion or incentive for modifying the reference to provide the desired result, and does not therefore provide a reasonable expectation that the desired result would be obtained. Sakurai therefore cannot render the instant claims unpatentable.

The Examiner states that the adhesion promoter of Sakurai is disclosed as being present in "less than 10 wt%, preferably less than 2 wt%." See Office action, p. 7, lines 20-22. Applicants disagree that Sakurai discloses this compositional range with respect to the adhesion promoter, there being no language present to equate or link the amount of organic acid additive with the amount of adhesion promoter. Sakurai specifically disclosed that the proportion of the *organic acid* used "is generally 10 wt% or less, preferably 5wt% or less, more preferably 1 wt% or less". Col. 15, lines 62-67. Sakurai further discloses that the composition can further contain "various additives *other than* the organic acids", but nowhere indicates that such additives are present within the ranges of amounts disclosed for the organic acids, does not teach that the "various additives" can or should be used in place of the organic acids, and nor does Sakurai disclose any range whatsoever for the "various additives". Col. 16, lines 1-3. Sakurai thus does not disclose or teach the limitation of an adhesion promoter in an amount of 0.1 to 2 wt%.

In failing to teach or disclose this limitation, Sakurai fails to account for the specific need for such a limitation as amply expressed in the instant Specification of the present invention. As disclosed in the instant Specification, the presence of less than 0.1 wt% of the lower layer hardener in the composition of instant Claim 1 causes pattern breakup and poor substrate adhesion; and if the lower layer hardener exceeds 2 wt%, residue can remain due to a low developing rate of the unexposed portion. See Specification, p. 3, ¶ [0042]. Also as disclosed in the instant Specification, the role of the lower layer hardener is to increase the hardness of the lower layer of the film to provide a solubility difference between the upper, middle, and lower layers of the film, which in turn provides a graduated difference in film thickness during development. See Specification, p. 4, ¶ [0052]. Further, it is disclosed in the instant Specification that the composition is invulnerable to film breakup during developing without rapid thickness reduction, and accordingly film thickness as a function of exposure energy ( $\gamma$ -value) decreases, allowing control of the thickness of the double layer structure. See Specification, p. 4, ¶ [0053]. Sakurai fails to disclose or demonstrate a formulation that, in the absence of the specific teaching of an amount of lower layer hardener, would provide a photoresist that would have the desired level of dissolution control as found in the photosensitive resin composition of instant Claim 1 and its dependents.

Sakurai also de-emphasizes the importance of such “various additives” as discussed above and relegates them to an optional role where it is disclosed that “the radiation sensitive composition comprises the above components (A) to (D)” where (A) is cyanine dye, (B) is alkali-soluble resin, (C) is polyfunctional monomer, and (D) is photopolymerization initiator, “as essential ingredients, and other additives as the case may be.” Col. 16, lines 31-33. In Sakurai, none of Examples 1-5, Comparative Examples 1-5, or Reference Examples 1 and 2 disclose the use of an additive such as an adhesion promoter, and neither is the presence or amount of any adhesion promoter claimed in Sakurai, further emphasizing that the inclusion generally of such additives is entirely optional for the composition of Sakurai. Indeed, the overall teaching of Sakurai is directed to color stability of the combinations of pigment compounds disclosed therein, to achieve a target  $\Delta E_{ab}$  for the composition thereof, as illustrated in the Examples and Comparative and Reference Examples of Sakurai. Col. 17, line 50 to Col. 21, line 62. The instant Specification does not disclose or claim this. As discussed hereinabove, the disclosure of the present invention is directed to the prevention of defects (film breakup) during development of the photosensitive resin film by use of an improved photosensitive resin composition with a specific additive included in a specific amount in order to achieve this particular performance. Sakurai, however, fails to provide a teaching or disclosure of either the specific amount of adhesion promoter, of or a particular type of adhesion promoter that would provide the gamma value performance as claimed in the instant claims, and thereby Sakurai fails to provide a suggestion or incentive that would motivate one skilled in the art to modify Sakurai to address the particular problem at hand of eliminating pattern breakup under the processing conditions disclosed in the instant Specification, and for which the photosensitive resin composition claimed in instant Claim 1 has been arrived at by Applicants.

One skilled in the art of photoresist formulation and processing will readily appreciate that even seemingly minor differences in photoresist composition (e.g., type and amount of an additive) can have a profound effect on the performance of a photoresist composition used under specific conditions, and that therefore such seemingly minor differences are in reality not minor at all, as illustrated by the performance of the claimed

photosensitive resin composition as found in Examples 1, 4, and 5 of the instant Specification. See Specification, p. 6, Table 3.

In the Examples of the instant Specification, Comparative Examples 1 and 3 without added lower layer hardener ( $\gamma$  values of 3.4 and 4.0, respectively) or Comparative Example 2 with a hardener included ( $\gamma$  value of 3.5) clearly show that an arguably equivalent composition as taught in Sakurai, and exemplified by these comparative examples, cannot meet the claimed performance requirements absent the particular, specified combination of lower layer hardener (3-acryloxypropyltrimethoxysilane) and amount (0.1-2 wt%) thereof. See Specification, p. 6, Table 3. Specifically, Table 3 shows that the use of a lower layer hardener in an amount of 0.1 to 2 wt% unexpectedly produces desirably low developing  $\gamma$ -value of 0.1-2.5 (1.3, 0.8, and 1.1 for Examples 1, 4, and 5, respectively), and that either a different lower layer hardener or a different amount of lower layer hardener than as instantly claimed (Comparative Examples 1-3 as discussed above) produces a larger  $\gamma$ -value (greater than 2.5), which is undesirable. Applicants thus respectfully maintain their earlier assertion that the invention is not obvious at least because the particular combination of claimed elements results in unexpectedly beneficial properties, and the reference fails to teach the particular combination of claimed elements.

As the Examiner has stated in citing *In re Dillon*, the *prima facie* case of obviousness is not undermined simply because applicant's motivation differs from the prior art's motivation. Office action dated March 6, 2007, p. 7, lines 14-17. Applicant's further note though that, according to *Dillon*, an applicant can rebut a *prima facie* case of obviousness by presenting comparative test data showing that the claimed invention possesses unexpectedly improved properties or properties that the prior art does not have. *In re Dillon*, 919 F.2d 688, 692-93, 16 U.S.P.Q.2d 1987, 1901 (Fed. Cir. 1990). As stated in the majority opinion in *Dillon*, the burden was on the applicant to overcome the presumption of obviousness and that the applicant did not do this by, for example, not producing evidence showing that *Dillon*'s composition possessed properties not possessed by the prior art compositions, or that the prior art composition and use were so lacking in significance that there was no motivation for others to make obvious variants, or that there was no attempt to argue the relative importance of the claimed compositions compared with the prior art. *In re Dillon*, 16 U.S.P.Q.2d 1902[6] to 1903[8] (Fed. Cir. 1990).

In finding a compositional limitation in the primary reference cited in *Dillon*, the court relied on an amount disclosed in the primary reference which was equivalent to the amount of water that the additive in question in *Dillon* was intended to remove. *In re Dillon, id.*, 1902[4]. There is no such teaching or disclosure of such an amount in Sakurai that can be clearly equated by logical step as exemplified in *Dillon* to correspond to the claimed amount of 0.1 to 2 wt% of lower layer hardener in Claim 1, and consequently, Sakurai cannot fairly be said to disclose this amount. Nor, in view of the unexpected results achieved by the use of this particular amount of lower layer hardener, and having the above-describe performance boundaries below 0.1 wt% and above 2 wt% of added lower layer hardener, would it be obvious to expect the outcome of adding a random amount of a lower layer hardener in the absence of such guidance as to the amount thereof.

Applicants respectfully assert therefore that, as detailed hereinabove, a showing has been made by Applicants demonstrating the non-equivalence of the composition of Sakurai to that disclosed in the instant specification and as claimed in the instant claims, and the commensurate lack of teaching in Sakurai that would show that the composition of Sakurai could function under the conditions disclosed in the instant Specification to provide the claimed  $\gamma$  value performance of the instant claims. Thus, for at least these reasons, Sakurai fails to teach or suggest the particular lower layer hardener identified (3-acryloxypropyltrimethoxysilane) and specified amounts of lower layer hardener (0.1 to 2 wt%) as claimed, which provide the desired  $\gamma$  value for which the composition of the instant claims has been formulated.

Further, and also as has been argued previously, though Sakurai discloses that adhesion promoting silanes may be present, and discloses a list of adhesion promoter silanes, Sakurai does not disclose that 3-acryloxypropyltrimethoxysilane can be used, nor does Sakurai (or the instant specification) teach or disclose that a methacrylate would provide equivalent performance to an acrylate. Methacrylates and acrylates are homologs, differing by the presence of (-CH<sub>2</sub>-) group. Homology, however, should not automatically lead to a conclusion of *prima facie* obviousness. *In re Elpern*, 140 U.S.P.Q. 224 (C.C.P.A. 1964). As stated by the *Elpern* court, the greater the difference in the carbon chain, the better the chance to argue against the presumption of obviousness. The case of *In re Mills* is particularly apt, wherein the C.C.P.A. found a methyl sulfate unobvious in view of prior

art alkyl sulfates having an alkyl "within the 8 to 12 carbon atom range". *In re Mills*, 126 U.S.P.Q. 513, 515 (C.C.P.A. 1960). There is a sound scientific basis for this holding. The close structural similarity of adjacent homologs may give rise to the presumption that the skilled artisan would expect these compounds to possess similar properties. *In re Henze*, 85 U.S.P.Q. 261, 264 (C.C.P.A. 1950); *In re Wilder*, 195 U.S.P.Q. 426, 430 (C.C.P.A. 1970). However, it is well known in the art that methacrylates and acrylates can have dramatically different reactivity ratios, and to expect that these moieties will behave in exactly the same manner under the same circumstances is mere speculation.

Regarding the particular lower layer hardener in question, because structural similarity is a poor indicator of equivalent performance in the field of polymer synthesis, Applicants therefore respectfully submit that the Examiner has failed to make out a *prima facie* case of obviousness. In support of this assertion, and as presented previously, Applicants again refer to the data of Table 3 of the instant Specification which clearly shows an unexpected non-equivalence of analogous methacrylate and an acrylate groups with respect to Example 3 (using 0.2 wt% of 3,4-epoxybutyl methacrylate, a compound also not disclosed in Sakurai), and having a resulting  $\gamma$  value of 0.9, compared with Comparative Example 2 (using 0.2 wt% of 3,4-epoxybutyl acrylate; as amended) having a  $\gamma$  value of 3.5. See the Specification, Table 3 and p. 5, ¶¶ [0059] and [0063]. By analogy and as understood from the data, the comparable acrylate and methacrylate have differing reactivities and consequently will provide different results. Thus, for the particular requirements of the photosensitive resin composition of instant Claim 1, it cannot fairly be said that a randomly selected adhesion promoter of those disclosed in Sakurai would provide the unexpected results of the Examples of the instant Specification, to provide the desired  $\gamma$  value performance as claimed in the instant claims.

It is therefore clearly seen in the above data that for the two lower layer hardeners of Example 3 and Comparative Example 2 of the instant Specification in question, each with different unsaturated functional end groups (i.e., acrylate and methacrylate), the acrylate and methacrylate each provide performance that is non-equivalent, and hence for the purpose of meeting the performance requirement of the claimed photosensitive resin composition of a  $\gamma$  value of 0.1 to 2.5, methacrylate and acrylate in the case of trimethoxysilylpropyl esters of these cannot be inferred to be equivalent from the

disclosure of the cited art or from the instant specification. Thus, use of one (e.g., an acrylate) to achieve a particular performance for a photosensitive resin composition ( $\gamma$  value of 0.1 to 2.5) would not be obvious over use of the other (e.g., a methacrylate).

Sakurai thereby fails to teach, suggest, or disclose 3-acryloxypropyltrimethoxysilane, in the claimed amount of 0.1 to 2 wt%; does not teach that any of the adhesion promoters of Sakurai are equivalent to 3-acryloxypropyltrimethoxysilane; and does not provide a suggestion or incentive that would motivate one skilled in the art to use the claimed lower layer hardener in an amount of 0.1 to 2 wt%, and for these reasons fails to provide a reasonable expectation that Sakurai would as disclosed provide the claimed  $\gamma$  value performance of instant Claim 1 as demonstrated by the Examples and Comparative Examples disclosed in the instant Specification for the claimed photosensitive resin composition. The reference thus does not teach all limitations of the instant claims, does not provide a suggestion or incentive for modifying the reference to provide the desired result, and does not therefore provide a reasonable expectation that the desired result would be obtained. Sakurai therefore cannot render the instant claims unpatentable, and as such, Applicants respectfully submit that independent Claim 1, and its dependent Claims 2-10 are patentable over Sakurai. Reconsideration and withdrawal of this rejection are respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the case are respectfully requested.



If there are any additional charges with respect to this Amendment or otherwise,  
please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

By: /Dana A. Gronbeck/  
Dana A. Gronbeck  
Registration No. 55,226  
Confirmation No. 5598  
Cantor Colburn LLP  
55 Griffin Road South  
Bloomfield, CT 06002  
PTO Customer No. 23413  
Telephone: (860) 286-2929  
Fax: (860) 286-0115

Date: July 6, 2007